WATERFOWL MANAGEMENT PLAN

Prince Edward Island

Environment Canada
Canadian Wildlife Service

Environnement Canada
Service canadien de la faune

Prince Edward Island
Community and Cultural Affairs
Fish and Wildlife Branch

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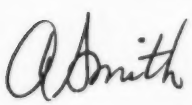
Ministère de l'Environnement
de l'Île-du-Prince-Edouard
Direction des pêches et de la faune

In 1986, the North American Waterfowl Management Plan was signed by the Minister of the Environment for Canada and the Secretary of the Interior for the United States.

The plan sets out several guiding principles to ensure conservation of our waterfowl populations. Key among these is the central theme that protection of waterfowl and its habitat requires long term planning and close coordination of management activities between various jurisdictions. Accordingly, the Canadian Wildlife Service and the Prince Edward Island Fish and Wildlife Branch have cooperated to produce this provincial waterfowl management plan.



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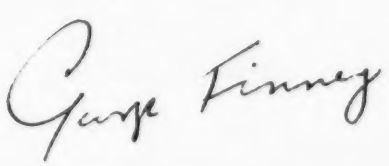

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Introduction

Waterfowl are an important natural resource for Prince Edward Islanders - as they are for all North Americans. They are the most important gamebird group and are a highly visible element of the Prince Edward Island scene. Waterfowl generally nest and raise their young in northern areas, migrating to more favourable southern areas to spend the winter. Each of the 26 species of ducks and geese that regularly occurs in Prince Edward Island is unique in its biology, distribution and movements. They represent an important natural resource which should be conserved and enhanced through sound management, affording both protection and use.

Prince Edward Island has many sites where substantial numbers of ducks and geese occur during spring and fall migrations. During the summer nesting and brood-rearing period, most duck species are widely dispersed, on ponds, rivers and marshes throughout the province. During winter, small ice-free areas in estuaries and a few ponds support overwintering Black Ducks (3000-5000), goldeneyes (1200), and mergansers (1000). In nearshore areas open leads in the ice pack are frequented by over-wintering Oldsquaws.

Waterfowl provide direct social and economic benefits to Prince Edward Islanders. Migratory Game Bird Permit sales varied between 5,100 and 6,400 over the last decade. A survey on the value of wildlife to Canadians (Federal-Provincial Task Force for the 1987 National Survey on the Importance of Wildlife to Canadians 1989) indicated that the direct expenditures in Prince Edward Island related to waterfowl hunting amounted to at least $1.25 million dollars in 1987. Total expenditures on hunting amounted to $4.3 million. Non-hunting activities related to wildlife, such as bird-watching and animal photography, contributed more to the provincial economy ($5.5 million) than did hunting.

Waterfowl populations are managed within the framework of the Convention for the Protection of Migratory Birds which was signed for Canada and the United States in 1916. This treaty recognizes that migratory birds, and particularly waterfowl, cannot be conserved and managed without the cooperative efforts of all provincial, state, and federal governments through whose jurisdictions they move. The treaty focussed on harvest regulation because over-hunting was a principal concern in the early 1900s. Since that time, the ability of governments to apply effective hunting regulations has ensured that legal harvest has seldom been implicated when a species is found to be in difficulty.

Despite the successes in waterfowl conservation achieved under the Convention, concern still exists regarding some species. Although harvest regulation continues to be an important element in the management of waterfowl populations, the focus of management agencies has gradually and increasingly shifted to the quantity and quality of the habitat which sustains these birds through their life cycles. The availability and distribution of waterfowl habitat must be considered in any modern management strategy.

In Prince Edward Island, pressures of habitat alteration are

not so obvious but are nonetheless important. Wetland drainage has not been a major factor on P.E.I. Soil erosion, perhaps P.E.I.'s most serious conservation problem, leads to heavy siltation of the Island's ponds, marshes and estuaries, thus reducing the value of those wetlands. Intensive agricultural use of adjacent uplands has resulted in a loss of nearby nesting cover and a decrease in waterfowl production in some wetlands. In the current context, the cumulative impacts of urban and cottage developments, toxic chemicals, acid rain, and many other factors, all contribute to habitat degradation.

Waterfowl management now demands the co-operative efforts of all those interested in the conservation of waterfowl: governments, conservation organizations, industry and private citizens. It also demands considerable time, ingenuity, and dollars. In 1986, Canada and the United States signed the first North American Waterfowl Management Plan. The plan sets the framework for continental waterfowl management for the next 15 years. Populations requiring priority attention are identified, and include the Black Duck in eastern North America. Specific remedies are proposed, and new mechanisms are identified which will improve on existing ones. For much of North America, and for most species, habitat conservation is identified as the top priority. For some species, improved harvest management may be called for, and in other cases there may be little that waterfowl managers can do to influence the situation. Specific research programs may be called for where managers don't understand what is governing population levels.

In March 1987, the province released the Conservation Strategy for Prince Edward Island. The Strategy outlines the conservation goals of the province which includes items specific to wildlife species and habitat management. The Prince Edward Island Waterfowl Management Plan builds on the broader framework of the North American WMP and the P.E.I. Conservation Strategy. Prince Edward Island's management actions must be integrated with those of other eastern portions of Canada and the United States. The Prince Edward Island WMP provides information on the waterfowl resource and its use on this broader scene (Fig. 1), to facilitate co-operative management.

The purpose of this document is to describe the existing situation with respect to waterfowl and their habitats, to establish goals and objectives, and to describe general strategies, programs and policies to achieve these objectives. The list of species requiring priority attention is expanded beyond those of "immediate international concern" and includes species of interest in Prince Edward Island such as the Canada Goose. This section of the plan uses the same time frame of 15 years as does the North American WMP. The Prince Edward Island Waterfowl Management Plan is a public document and should act as a guide and reference for all who have an interest in the conservation of the natural resources of the province.

A supplementary document will be developed by the government and non-government agencies contributing to the implementation of the WMP. That document will specify activities which will be undertaken by the parties actively participating in the conservation and management of waterfowl and their habitats. It will be reviewed each year and updated as required.

Figure 1. The Atlantic Flyway, with the position of Prince Edward Island within the system.

Goals and Objectives

The goals of the Prince Edward Island WMP are in accordance with the P.E.I. Conservation Strategy. These goals are:

- to maintain or enhance the diversity of waterfowl species;
- to secure, enhance, and increase the quantity and quality of waterfowl habitat in order to maintain waterfowl populations at desired levels of abundance and diversity;
- to provide waterfowl use and enjoyment opportunities in a variety of forms for the benefit of Prince Edward Islanders and their visitors;
- to maintain waterfowl populations at levels which
  - ensure their perpetuation, and are consistent with international goals,
  - provide acceptable levels of benefits, and
  - are compatible with other resource uses and community interests.

For most species the objective is to maintain populations at, or somewhat above, current levels.

For Black Ducks, an increase of 30 per cent in the continental population is called for in the North American WMP. For this objective to be met, enhancement of breeding Black Duck numbers in Prince Edward Island must be a priority, and this is reflected throughout the plan.

Duck and goose populations - general

Government agencies have been monitoring provincial waterfowl populations intermittently since the 1930s, and general patterns of occurrence and relative numbers are known. Systematic and continuing data sets are lacking, and thus trends and absolute abundance can not be estimated precisely. A waterfowl population budget (Erskine 1987) includes estimates that provide orders of magnitude; this allows comparison of Prince Edward Island populations to those in other areas. Breeding pair and brood surveys conducted since 1983 confirm that the earlier estimates were of the correct order for most species, although some changes have occurred.

Estimated spring (breeding plus non-breeding) populations of waterfowl in Prince Edward Island by species (from Erskine 1987) are compared to those in other Atlantic Provinces, and to the Atlantic Flyway as a whole, in Table 1. Flyway totals are adapted from U.S. Fish and Wildlife Service Mid-winter Inventory data. The most important species of waterfowl in terms of nesting numbers are Black Ducks, Blue-winged Teal, and Ring-necked Ducks. Spring populations of other species are relatively minor.

Breeding populations tell only part of the story. Each spring and fall, local numbers swell as birds migrating to and from their nesting grounds in the north stop-over in P.E.I. Some areas along the shores and open streams in Prince Edward Island also harbour over-wintering ducks. It is from the fall and winter populations of waterfowl that the harvest is taken.

The groupings of ducks used in the North American WMP require modification in the Atlantic Provinces, where the coastal habitats frequented by diving ducks are more important than in other provinces. A useful segregation here is as "inland ducks" (dabbling ducks plus Ring-necked Duck, goldeneyes and Common Merganser), vs. "sea ducks" (eiders, Oldsquaw, scoters, Red-breasted Merganser, Harlequin Duck). The scaups and Bufflehead, which are present only during migrations, occur mainly on coastal waters.

INLAND DUCKS

The inland ducks are the most abundant and widespread group in Prince Edward Island and the most important ducks to sport hunters. The Black Duck, Blue-winged Teal, and Ring-necked Duck are the major species, comprising over 80% of all breeding inland ducks in the province. Some species formerly considered as western ducks have made a modest incursion in the province, largely in suitable habitats on managed marshes. These include American Wigeon, Pintail, and Gadwall.

Waterfowl traditions in the Maritimes refer to the skies and marshes teeming with fowl of all types, prior to the arrival of European settlers. Systematic attempts to quantify waterfowl population trends began only in the 1930s. Most of the inland ducks in Prince Edward Island probably increased in the 1930s through 1950s when breeding of Ring-necked Ducks,

Table 1. Estimated spring populations (individuals, including breeders and non-breeders) of waterfowl in Atlantic Provinces (adapted from Erskine, 1987), with comparisons to Atlantic Flyway (adjusted from Midwinter Waterfowl Inventory, mean of 1975-84).

Species	Spring Populations (individuals) P.E.I.	N.B.	N.S.	Nfld.	Labr.	P.E.I. as % of AF	P.E.I.as % of AF MWI* 75-84
Wood Duck	100	4200	300	-	-	2.2	0.1
Green-winged Teal	1100	10400	7600	16500	45900	1.3	0.2
Black Duck	4700	49300	31900	37000	32800	3.0	0.4
Mallard (excluding feral)	100	1100	300	100	600	8.7	0.02
Pintail	700	1100	600	1100	2500	11.7	0.3
Blue-winged Teal	5600	12300	10100	300	-	19.3	2.5
American Wigeon	1100	1100	600	800	-	30.6	0.4
Ring-necked Duck	4800	15400	11500	15700	1400	9.8	1.0
Greater & Lesser Scaups	tr	tr	-	100	26900	tr	tr
Common & Barrow's Goldeneyes	tr	10200	700	15100	14700	tr	tr
Common & Hooded Mergansers	-	1000	700	6000	7000	0	0
Red-breasted Merganser	400	800	600	10900	56000	0.6	0.3
Common & King Eiders	-	28000	32000	1200	55000	0	0
Harlequin Duck	-	-	-	70	1800	0	0
Oldsquaw	-	-	-	-	1100	0	0
Surf & Black Scoters	-	-	-	-	24900	0	0
Canada Goose	300	100	300	18400	90400	0.3	0.03

* MWI adjusted for visibility thus: Wood Duck, Green-winged Teal, other dabblers, Ring-necked Duck, divers and geese, scoters & mergansers, x 10 (in woods & shrubbery); x 4 (in marshes); x 1 (open water); x 3 (out to sea)

MWI adjusted for species wintering S of U.S.A., thus: Green-winged Teal, x 1.2; Blue-winged Teal, x 5; Shoveler, x 1.2; American Wigeon, x 1.2; Ring-necked Duck, x 2.5.

Mergansers were not segregated to species in MWI - here arbitrarily split 33% Common & Hooded, 67% Red-breasted. (## wintering within AF deducted from total before calculation for Black Duck, all divers, Canada Goose.)

x estimate certainly too high (i.e. adjustments insufficeient to remedy incomplete coverage of MWI).

Not listed in Table 1, but included in totals in text, are: (i) minor breeders - Gadwall, Shoveler, Redhead, Ruddy Duck; (ii) regular migrants or winterers - White-winged Scoter, Bufflehead, Brant; (iii) vagrants - Eurasian Wigeon, Snow Goose.

Table 2. Waterfowl population trends and goals for major species in the Maritime Provinces.

Major Species (-groups)	Maritimes Trend in Breeding Numbers	Maritimes Goals (year 2000)
Wood Duck	none evident	maintain numbers
Green-winged Teal	kill/effort declining	halt decline*
Black Duck	kill/effort increasing	increase numbers (as in NAWMP)*
Mallard	scarce, increasing	maintain numbers*
Pintail	none evident	maintain numbers
Blue-winged Teal	stable, variable	maintain numbers
American Wigeon	scarce. increasing	allow increase
Ring-necked Duck	kill/effort stable	maintain numbers
Common Goldeneye	kill/effort stable	maintain numbers
Mergansers	none evident	maintain numbers
Common Eider	stable	maintain numbers
Canada Goose	scarce, stable (migrants increasing)	allow increase

* As discussed in text.

Pintails, Wigeons and Mallards was first confirmed. Numbers seem to have stabilized in the last 20 years, except for the continued increase of Ring-necked Ducks and the decrease in Black Ducks. A further influx of western species, particularly Gadwalls, has occurred on managed impoundments. Estimates of population trends of inland waterfowl in the Maritimes are shown in Table 2, with the general objectives for each species.

According to the U.S.F.W.S. Mid-winter Inventory, the Black Duck suffered a serious decline over the past 30 years. On the breeding grounds the decline was most evident in southern Ontario and south-western Quebec where Mallards have largely replaced the Black Duck. In Prince Edward Island, as elsewhere in the Maritimes, the Mallard is still infrequent relative to the Black Duck, but its numbers are increasing gradually.

Any increase of the Mallard in Prince Edward Island will probably influence the Black Duck. Most Mallards here to date occur as a result of releases; they centre on aviculturists who fail to confine their birds. Birds from these areas disperse locally and often nest successfully. Some inter-breeding occurs with wild Black Ducks. Unless such Mallards are confined, the Black Duck may ultimately be replaced as a breeding bird in at least the agricultural areas of Prince Edward Island. This situation poses concern for the continued survival of the Black Duck as a recognizable entity. On the other hand, most of the public are happy to see Mallards - or any ducks - in their locale; few hunters have a strong preference for one large duck over another, and some prefer Mallards. This creates a policy dilemma for wildlife management agencies; however, the welfare of endemic stocks must be one of their principal concerns. A policy has been adopted that semi-wild Mallards should be confined to the degree possible to avoid inter-breeding and excessive competition with Black Ducks. The relative abundance of Blacks and Mallards will continue to be monitored.

The North American Waterfowl Management Plan objective of 385,000 Black Ducks, as measured by the Mid-Winter Inventory, can only be reached if nesting populations and/or recruitment increase in Canada, where over 90% of the species' numbers breed. The Black Duck Joint Venture on surveys and research, co-sponsored by the CWS and the USFWS, was developed to help devise a strategy to address the continental objective in this area. By 1990, a specific population objective for breeding Black Ducks will be established for Prince Edward Island.

The North American WMP identifies the requirement for independent means of verifying population trends. In 1983-87, breeding pair surveys for Black Ducks were established throughout eastern Canada, as set out in the Black Duck Joint Venture. In Prince Edward Island, breeding pair surveys will be continued to monitor trends in Black Duck abundance as part of the continental effort. These surveys are also proving useful for monitoring trends in other ducks.

Brood production surveys also have been, and are being, conducted in Prince Edward Island, although there is no long series of systematic efforts. These surveys are more variable than breeding pair counts for monitoring trends in

abundance, but they help to predict the fall flight by providing an index to reproductive success of the birds. This information is of obvious interest to hunters as well as to managers. Regular brood production surveys will be continued in Prince Edward Island.

A varying number of Black Ducks over-winter in open-water areas around the eastern 2/3 of the island. Their abundance and distribution depends on the severity of the winter and the ice conditions. Thus, winter surveys are not ideal for monitoring trends in abundance of the species, but they are useful for other purposes including as an adjunct to USFWS winter inventories. Mid-winter surveys for Black Ducks will be undertaken in Prince Edward Island as an element of the Black Duck JV.

In developing a continental harvest strategy for Black Ducks, waterfowl managers have to assess carefully the population status and the impact of hunting relative to other factors in regulating the population. P.E.I. waterfowl harvest estimates are shown in Table 3. Surveys of hunter activity and success will be maintained, and upgraded where possible, to obtain reliable estimates of harvest of all species of waterfowl. Harvest surveys also provide a second index to abundance as they provide a measure of take per unit effort.

For many years, wildlife agencies have been banding Black Ducks and other species in an attempt to answer important management questions. The data from these efforts have proved particularly useful in describing harvest patterns and dispersal of birds. Banding has fallen well short of expectations as a means for measuring survival rates, and it has not clarified the key question of the relative importance of hunting and non-hunting mortality. Some inferences can be drawn regarding relative harvest rates of adult vs. young or male vs. female birds. Banding will continue to be used in Prince Edward Island to help ascertain distribution and movement of birds, but will not be pursued primarily as a mechanism for examining survival/mortality rates. Banding and recovery data will be examined specifically to confirm dispersal patterns and estimate mortality rates.

Published data on the population characteristics of Prince Edward Island Black Ducks are scanty, but banding data suggest that some Blacks are year-round residents of the province and do not migrate south for the winter. Research is required to confirm which elements of Prince Edward Island Black Duck populations are resident and the factors most affecting their population dynamics. If a substantial proportion of the province's Blacks were resident, this might have major implications on the management strategies to be adopted.

The causes of the decline of the Black Duck through much of its range are not clear. The Mallard is strongly implicated. The Black Duck, a closely related form, may be succumbing to genetic swamping due to inter-breeding with Mallards, or it may be simply out-competed in an environment which has been markedly altered by Man. Some have argued that over-hunting has been and remains a factor, but the evidence is inconclusive. Research will attempt to ascertain the relative importance of factors implicated in the Black Duck decline, such as

Table 3. Waterfowl harvest (mean of 1973-83, adapted from Erskine 1987), for Prince Edward Island, with comparisons to Atlantic Provinces and Atlantic Flyway totals.

Species	Retrieved kill by province (rounded off to 100s) P.E.I.	N.B.	N.S.	Nfld.	Labr.	P.E.I.as % of AR total	P.E.I.as % of Flyway total
Wood Duck	20	2100	500	100	30	0.7	0.004
Green-winged Teal	6700	9700	12500	8600	1600	17.1	3.2
Black Duck	17900	25000	59100	15000	4000	14.8	3.8
Mallard	600	1500	1800	300	100	13.9	0.1
Pintail	800	1100	900	400	400	22.2	1.3
Blue-winged Teal	1100	5000	1600	500	50	13.3	1.0
American Wigeon	300	1600	400	100	40	12.2	0.4
Ring-necked Duck	500	3800	2900	3900	300	4.4	0.3
Greater & Lesser Scaups	60	700	700	300	1300	2.0	0.1
Common & Barrow's Goldeneyes	300	4900	5300	6100	3400	1.5	0.4
Bufflehead	80	600	2500	10	200	2.4	0.1
Hooded & Common Mergansers	100	1400	2500	2600	800	1.3	0.2
Red-breasted Merganser	700	800	2500	1900	1300	9.7	4.0
Common & King Eiders	50	600	9400	63800x	10700x	0.06	0.04
Harlequin Duck	0	0	50	100	100	0	0
Oldsquaw	500	400	3100	10200x	1500x	3.2	1.3
Black, Surf, and White-winged Scoters	260	900	9300	22000x	6600x	0.7	0.2
Canada Goose	13300	3800	8400	7200	3500	36.7	2.8

• (U.S.-Atl.Fl.) & AR + Quebec (not Ontario), mean of 1977-84 kill, not adjusted for crippling loss.
x The harvest of sea ducks in Nfld. & Labr. here covers only the period through early January, as in the other provinces; the total kill, particularly of eiders, is substantially larger, as the hunting season there extends until 10 March. The species composition shown differs greatly from general impressions, with too many scoters relative to eiders and Oldsquaws; there is no objective way of adjusting these figures at present.

interaction with Mallards, habitat alteration, weather, acid rain, lead shot, and hunting mortality. A carefully co-ordinated research program is an important element of the Black Duck JV, and some of that research will be undertaken in Prince Edward Island.

In 1983, in response to concern that over-hunting may be contributing to the Black Duck's decline, special regulations were put in place in the United States for 5 years with the intent of reducing harvest pressure. Similar restrictions were introduced in Canada in 1984. Only slight restrictions were imposed in Atlantic Canada, where the evidence of a decline in Black Ducks is weak. In 1988-89, wildlife management agencies of Canada and the United States evaluated the status of the Black Duck and the effect of the harvest restrictions which have been in effect since 1983-84. Surveys of breeding Black Ducks on P.E.I. show a population decreasing by an average of 5% to 10% per year since 1983. This indicates that a more conservative harvest strategy should be adopted. Banding data show that most birds raised in P.E.I. are harvested there; therefore, harvest restrictions need to be applied in P.E.I. in order to be effective. Beginning in 1989, hunting regulations were adjusted for a period of 5 years with the objective of reducing harvest of P.E.I. Black Ducks by 20%-30% annually.

Both Blue-winged Teal and Green-winged Teal are relatively numerous in the province. Hunter surveys show declines in harvest, both absolutely and on a take/unit-effort basis, of Green-wings over the recent past which suggests that there may be a decline in this species' numbers. Regrettably, there is no cost-effective way to get an independent estimate of this trend. Continental estimates of abundance (based on surveys in the west) show no overall declines. The population status of Atlantic Canada Green-winged Teals will be monitored, and if current indications of a downward trend in Green-wings continue special surveys and research will be implemented to validate the trends and assess causative factors.

Introduction of Wood Ducks, and provision of nest boxes for them, have developed a small breeding population in Prince Edward Island, where the species earlier was largely a post-breeding wanderer. Numbers and reproduction of other dabbling ducks will be monitored by regular surveys as described for Black Ducks.

Both Scaup species and the Bufflehead occur regularly during the migrations. The two Goldeneye species and the Common Merganser regularly occur in the province during migration and in winter. There is no convincing evidence of trends in numbers of these species in Prince Edward Island in recent decades (Table 2), and no overall continental trends were noted in the North American WMP. The status and harvest of these ducks will be monitored using generalized surveys as described for other inland ducks. Special surveys and research projects will be implemented as required.

SEA DUCKS

The sea ducks are relatively unimportant in Prince Edward Island, where they occur mainly as migrants. The Red-breasted Merganser is the

only regularly breeding species in this group. Oldsquaw, all three scoters, and Common Eider are seen regularly in spring and fall, and a few eiders moult alongshore in summer. Only Oldsquaw is regularly encountered in large numbers.

With decreasing availability of Black Ducks, harvest pressure in some areas may be swinging towards the sea ducks, principally eiders and scoters. There is no such tendency in Prince Edward Island, and none is anticipated, as these birds are less accessible than other, preferred species. Harvest levels for sea ducks will not be liberalized unless managers have convincing evidence that populations can withstand additional pressure.

Another seaduck, the Harlequin Duck, is very rare off Prince Edward Island. This species is found only around offshore islands and headlands, and likely was never common in the province. A conservative harvest strategy is necessary, given the low population level of the species in the east. A status report recently prepared for the eastern population of the Harlequin Duck indicates that numbers have been reduced and may now be at a precarious level. In Prince Edward Island, the season was closed for Harlequin Ducks beginning in 1987.

GEESE

Canada Geese are the most important species to waterfowl hunters in Prince Edward Island, where they occur almost throughout the island. More effort and money is spent in pursuit of them than any other species. They occur in P.E.I. primarily as migrants, breeding in Newfoundland, Labrador, and northern Quebec. They winter south to North Carolina and form part of the large, poorly differentiated group known as the Atlantic population. Overall numbers in this population have increased over the last several decades. Coastal goose surveys conducted annually in mid-November through the 1970s and 1980s indicated gradually increasing numbers in P.E.I. in fall. Inland flocks were not monitored. It is unclear whether the increase reflects an overall change in abundance or in migratory patterns. Surveys will monitor populations of Canada Geese in Prince Edward Island during spring and fall migrations. In conjunction with these surveys, banding and research projects will examine turnover rates and migratory routes.

A few hundred geese nest in the province, largely descendants of escapees from parks and aviculturists. Some introduced breeding populations in other parts of Canada and the United States have expanded, resulting in agricultural depredations and nuisance problems. These often led to difficult and expensive programs to control the introduced population. On the other hand, many people enjoy having Canada Geese as a feature of their neighbourhood. To date, problems with introduced Canada Geese in P.E.I. have been relatively minor and localized. Government agencies will discourage further attempts to introduce Canada Geese as nesting birds in Prince Edward Island and will attempt to control expansion of existing feral flocks.

The only other regular visitor to Prince Edward Island in the goose family is the Atlantic Brant. Brant pass northward through the Bay of Fundy and the western Gulf of St. Lawrence, but in numbers far fewer

than prior to the eelgrass die-off of the 1930s. Few Brant pass through Prince Edward Island in the spring and even fewer in fall, and they do not figure in the hunt.

A possible spectre on the horizon for geese in Prince Edward Island is the threat of recurrence of eelgrass blight, which devastated this principal food source in the 1930s, and one agent of which has recently been detected along the coast of New England. There is very little management agencies can do to abate its progress, but the spread of eelgrass blight, and its effect on goose numbers and distribution, will be monitored. It is unlikely that a recurrence of eelgrass blight will have disastrous effects on Canada Geese in P.E.I. because of the species' adaptation to agricultural food sources.

Use and Value of Waterfowl

The real value of waterfowl to the people of Prince Edward Island is not directly measurable. Prince Edward Island would be a less attractive province if its waterfowl - or other wildlife resources - were depleted. The value of a resource such as waterfowl is partly intrinsic, and partly related to use. The Migratory Birds Convention explicitly recognized the need to conserve species of birds that are useful, including waterfowl.

Under wise use and management, regulated hunting of waterfowl can continue without risk to future populations. Governments will attempt to provide maximum opportunities to hunters in Prince Edward Island consistent with the concepts of sustainable use and international resource-sharing.

Estimates of the retrieved harvest of waterfowl are summarized in Table 3. The figures for Prince Edward Island are presented together with those for the other Atlantic Provinces, and for the Atlantic Flyway, to show the relative impact of the Prince Edward Island hunting effort. Prince Edward Island takes only a small proportion of the total harvest, but over the last decade the province has accounted for nearly 4% of the Black Duck harvest, and 3% of the Green-winged Teals and Canada Geese taken, in the Atlantic Flyway.

Regulation of harvest is one of the main tools of waterfowl managers. Regulations are set based on the level of harvest which is believed to be sustainable. In estimating total take from a population, waterfowl managers routinely adjust the legal reported harvest to allow for crippling loss and poaching. In P.E.I., as in most areas, estimates of crippling loss and illegal harvest are based upon a weak data set, yet these factors may have an important influence on the population balance. Efforts will be continued to improve estimates of illegal harvest and crippling loss so as to appreciate the full impact of harvest on waterfowl populations.

Because waterfowl are migratory, harvest regulations in Prince Edward Island must be co-ordinated with those in other jurisdictions. They must attempt to restrict illegal activity while not unnecessarily impeding the legal

user. Regulations obviously also constrain hunter activity and must therefore be tailored to hunter needs and attitudes as much as possible. For this reason government agencies conduct hunter preference surveys which provide a useful base of information for regulation setting. Hunter preference surveys will be repeated periodically to assess hunter perspectives related to harvest regulations. In addition, regulatory agencies will continue to consider regulatory proposals forwarded by hunter and conservation groups.

Enforcement of hunting regulations is an essential element of waterfowl management and requires the co-ordinated actions of many agencies. The Canadian Wildlife Service is responsible for the co-ordination of enforcement activities, but the principal federal responsibility for enforcement rests with the RCMP. Provincial wildlife officers also play important roles in enforcement. A vigorous enforcement effort will be continued, and improved where possible, to attempt to minimize illegal hunting activity. Annual enforcement plans will be discussed among enforcement agencies to establish the most effective ways of achieving required objectives.

The purpose of enforcement is to improve compliance with regulations. Solid enforcement is essential, but alone it is not enough. Public information and education must play key roles. The Prince Edward Island Hunter Education Program will provide a focus on natural resource conservation and the importance of safe and ethical hunting practices with reference to waterfowl.

The survey of the value of wildlife to Canadians showed that even more Islanders participated in wildlife-related activities than hunted. Non-hunters share with hunters an interest in maintaining a numerous and diverse waterfowl resource which is distributed so that access to it is relatively easy. Wildlife Management Areas and sanctuaries will be maintained to attract and maintain numbers of waterfowl, and to provide viewing opportunities to all.

Canadian society tends to value wildlife highly as part of our heritage and identity, but, regrettably, it treats wildlife as an unvalued or free good. A healthy wildlife resource has a hard cash value to Prince Edward Islanders as well as its intrinsic values. In 1987, wildlife-related activities were estimated to have contributed $9.7 million to the Prince Edward Island economy. It is essential that the message of the 1987 study becomes commonly appreciated. Conservation organizations, both public and private, will be encouraged to promote widely information showing the economic values of wildlife. A survey on the value of wildlife to Canadians will be repeated periodically, beginning in 1988.

Although the value of waterfowl to Prince Edward Islanders is decidedly positive, problems, usually of a local nature, can arise with particular species on occasion. Reference was made earlier to experiences with introduced Canada Geese as nuisance birds. Governments will provide advice to citizens on how such problems can be mitigated. The introduction of species which may cause problems to resident species or to people will be discouraged.

Habitat

Habitat is the single most important factor in sustaining population levels for all waterfowl species in the province. The continued presence of waterfowl, and continued opportunities for their use and enjoyment, depend upon the maintenance of and access to suitable habitats. If habitats are destroyed or otherwise degraded, the waterfowl that depend on those habitats will also decrease. Alternatively, improving habitats can pave the way to a more abundant and diverse waterfowl community. Because waterfowl are migratory, habitat quality and quantity in other Atlantic provinces and states are also critical to the well-being of this shared resource. Thus, the principal focus of the North American WMP is on international habitat conservation efforts.

The NAWMP specifies that habitat quality and availability is the key to waterfowl abundance, and attributes recent declines observed for many North American species to the degradation and disappearance of wetlands. This is particularly obvious on the Prairies, where a major habitat initiative is proposed, and it is also pertinent in Prince Edward Island.

Currently there are many development pressures which can lead to the degradation of important wetlands. Many of these developments depend on federal or provincial funds. Wildlife agencies of the federal and provincial governments will continue to explore the feasibility of developing an agreement to ensure that government funds do not sponsor degradation of designated wetlands.

Areas in Prince Edward Island which are used by significant numbers of waterfowl are shown in Table 4 and Figure 2. Special measures are required to ensure their continued value. Some of these sites warrant designation under the Convention for the Protection of Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention), and are so marked in Table 4. Malpeque Bay was designated as a RAMSAR site in June 1988. Federal and provincial wildlife agencies will continue to evaluate sites which are potential Wetlands of International Importance, and will propose their formal recognition when appropriate.

All of the sites listed in Table 4 warrant special conservation from a provincial perspective. Various approaches are possible, including acquisition and management by conservation agencies (public and private), special designations, land-use restrictions or incentives. In many cases no special additional action is required. The mechanisms chosen depend on a wide variety of factors including the nature and imminence of threats, land ownership, and cost-effectiveness. Every effort will be made by public and private conservation organizations to ensure that sites identified as of importance to the conservation of waterfowl in Prince Edward Island are not degraded.

Prince Edward Island has the most extensive migration habitat for Canada Geese in the Maritimes. Numbers of geese on the Island at times exceed 50,000 birds during both spring and fall. Geese make

Table 4. Major waterfowl concentration areas, Prince Edward Island, with approximate use by major species.

Location	Species using (no.)	Type of use
1. Malpeque Bay *	Inland ducks (2000+)	Breeding, staging
	Canada Goose (10,000)	Staging
2. New London - Rustico - Covehead Bays	Inland ducks (3000)	Breeding, staging
	Canada Goose (2500)	Staging
	Brant (500)	Staging
3. Hillsborough River	Inland ducks (2000)	Breeding, staging
	Canada Goose (3000)	Staging
4. Rollo - Cardigan Bays	Inland ducks (1000)	Staging, wintering
	Canada Goose (5000)	Staging
5. Orwell - Pownal Bays	Inland ducks (1000)	Staging
	Canada Goose (3000)	Staging
6. Charlottetown Hbr., North and West Rivers	Inland ducks (2500)	Staging, wintering
7. Desable - Tryon shores and bays	Canada Goose (3000)	Staging
	Brant (500)	Staging
8. Bedeque Bay, Dunk and Wilmot Rivers	Inland ducks (1000)	Breeding, staging
	Canada Goose (5000)	Staging

* Area designated as Ramsar site.

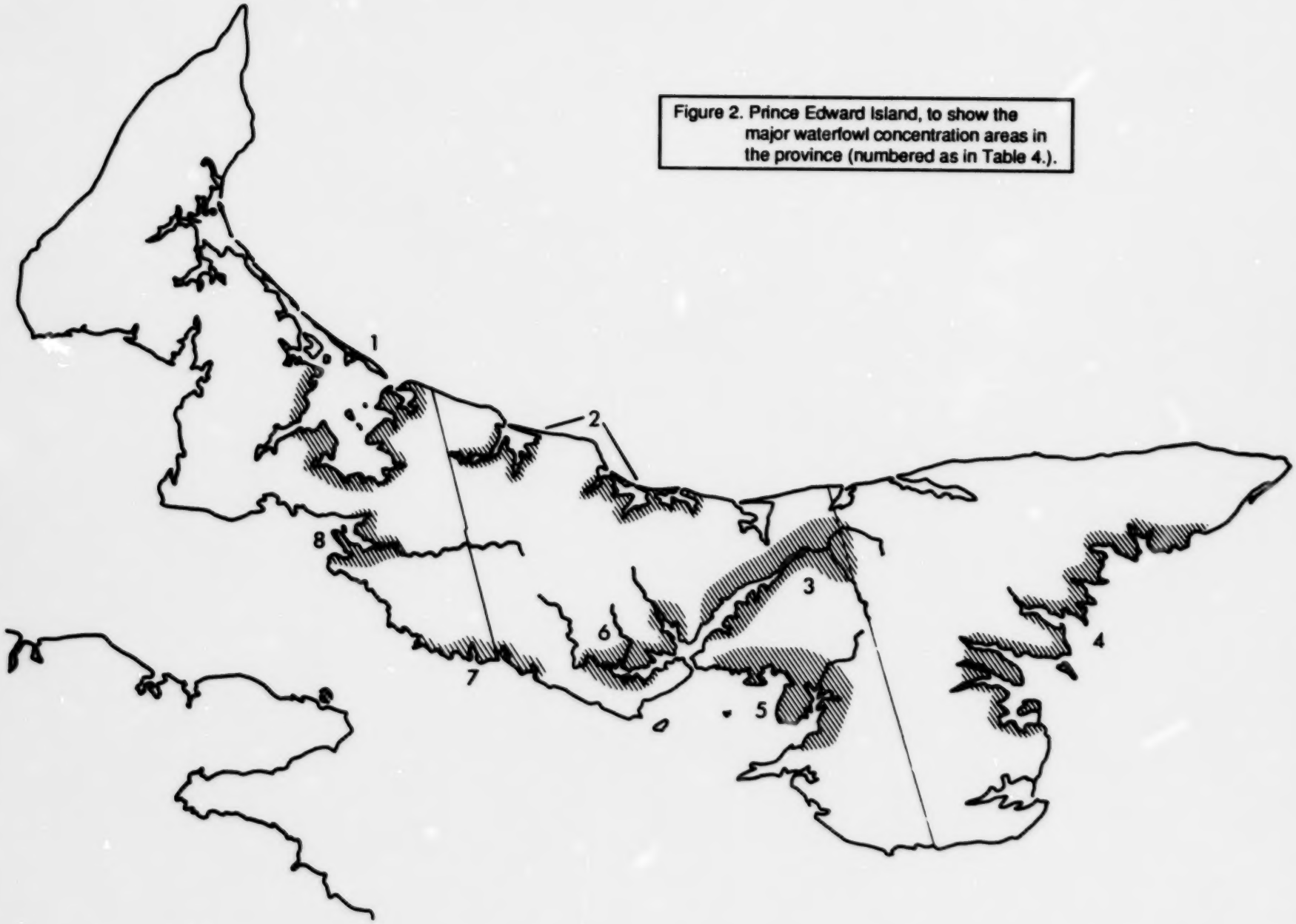

Figure 2. Prince Edward Island, to show the major waterfowl concentration areas in the province (numbered as in Table 4.).

extensive use of shallow bays, estuaries and coastal lagoons, as well as upland agricultural fields. The coastal habitat is diverse, with over 900 small salt marshes totalling over 4800 hectares, and expansive estuarine habitats (43,500 ha) many of which support dense beds of eelgrass (Zostera marina). Over the past 30 years, an increasing pattern of field feeding by Canada Geese has greatly enhanced hunting opportunities, to the point that Islanders now enjoy the best goose hunting success in the nation. Goose hunting has become popular with residents, but it is also attracting a growing number of out-of-province hunters. Many farmers have altered crop rotation and ploughing times to make their fields attractive to geese, and lease them for hunting during the fall migration. Goose hunting now contributes to farm income and modestly extends the tourism period into the fall season, thus contributing to the economy of local areas. Wildlife agencies will promote the retention of upland habitats (oat and corn stubble) at key locations associated with coastal migration sites to provide greater opportunities for goose harvest and to maximize the contribution of this renewable resource to the economy of the Island.

Most areas used by concentrations of migrating and wintering ducks in Prince Edward Island are in the coastal zone. The North American WMP calls for the protection of an additional 4000 ha (10,000 acres) of migration and wintering habitat for Black Ducks in eastern Canada, as part of the efforts needed to improve the status of this species. Habitat objectives identified in the NAWMP are being implemented within the framework of the Eastern Habitat Joint Venture (EHJV). Sponsors of this program will include the federal governments of Canada and the United States, provinces of eastern and central Canada, eastern states, Ducks Unlimited (both Canadian and U.S. arms), and Wildlife Habitat Canada. The scope of the joint venture was defined by agreement during 1989. It is expected that it will accelerate securement, creation, and management of marshes, and positively influence wetland ecosystem health. The first project of the EHJV was launched in P.E.I. in late 1988.

A traditional approach to protecting important waterfowl areas has been acquisition and management by government agencies. In Prince Edward Island, Ducks Unlimited Canada has sponsored 74 wetland enhancement projects totalling 2,336 ha. More recently, another private organization, Wildlife Habitat Canada, has helped fund the acquisition of the important Deroche Point wetlands and some other sites.

Acquisition is a costly way of securing waterfowl habitat, and often it is not practical for a variety of reasons. It remains the most permanent and versatile means of wetland protection, although annual management costs also serve as a deterrent. Important areas for waterfowl will be secured and managed by wildlife agencies when other options are clearly not viable.

The provincial government and Ducks Unlimited Canada are currently implementing an agreement (1984-89, extended pending re-negotiations) to develop and manage waterfowl habitats. Additionally, Wildlife Habitat Canada and the provincial government, along with D.U. and the Canadian Wildlife Service, are implementing a co-operative under-

taking (1987-1993) known as the Wetlands Protection and Enhancement Program. This represents an important first step in a comprehensive and cooperative effort to manage wetlands for the benefit of wildlife. Cooperative wetland conservation and enhancement programs involving both levels of government and conservation agencies will be developed and implemented as a key feature of the Waterfowl Management Plan.

The creation of managed marshes through development projects on public and private wetlands has resulted in an overall increase in production and staging. However, many managed marshes are not realizing their potential value to waterfowl nor to people. Management plans have been prepared for many managed areas, but to date intensive marsh management has been a lower priority, both to government agencies and to Ducks Unlimited, than securing existing wetlands facing degradation. Most large sites suitable for management have already been developed. As impounded areas age, many become choked with vegetation or depleted in free nutrients. It is estimated that some marshes are supporting less than 50% of the waterfowl which they could accommodate under optimum but realistic conditions. Efforts to improve productivity of controlled marshes through management are expected to increase in the future. The development of suitable techniques through research will allow more intensive management of existing wetlands in agricultural and coastal areas. Intensive management of controlled marshes will be pursued as a means of increasing waterfowl usage and meeting objectives of this plan. This is reflected in the Wetlands Protection and Enhancement Program recently initiated on the Island.

Some marsh management is underway each year in Prince Edward Island using established techniques,but marsh management in the Maritimes context is still evolving. Further research will be supported to improve understanding of how marshes can be managed to maintain and improve their importance to waterfowl.

Protecting and enhancing important sites for waterfowl in Prince Edward Island is not sufficient alone to ensure that populations levels are maintained. Inland ducks are widely dispersed on freshwater and coastal wetlands during nesting, brood-rearing and moulting periods. The value of wetlands to waterfowl varies widely. The Canadian Wildlife Service and the P.E.I. Wildlife Division recently published a Wetland Atlas for Prince Edward Island; this maps and assesses the ecological value of each freshwater or coastal wetland larger than one-quarter hectare, given current patterns of use. The atlas is designed as a guide for land-use planners at all levels of government. Because of the design of the rating system, wetlands given a relatively low rating could still be of substantial value to waterfowl. Research will be undertaken to modify the ratings of Prince Edward Island wetlands so that their comparative value for waterfowl production and use will be more evident.

Threats and Assessment

Because of the soil characteristics of most of Prince Edward Island, acid rain is not considered likely to affect the natural environment, notwithstanding the province's geographical position relative to industrial North America. Research is being undertaken in the Maritimes, as part of Canadian efforts, to assess the importance of acid rain to waterfowl and to monitor impacts over time.

Many important economic development projects may have impacts on waterfowl. As part of environmental impact assessment processes, federal and provincial wildlife agencies will advise on predicted effects of development proposals and suggest mitigative measures.

Direct threats to waterfowl, and to other wildlife, can arise from the use or disposal of toxic chemicals. Water birds are extremely susceptible to the effects of oil spills because exposure to minimum amounts of oil can lead to death. Wildlife agencies provide advice to others with respect to the registration, handling and disposal of toxic substances. Research often is necessary to determine the potential impact of a particular chemical. Research will be undertaken, on a priority basis, to provide advice to regulatory agencies and industry on the potential hazards to waterfowl and their habitats of specific substances, including oil.

Concern is increasing throughout North America over the hazard posed to waterfowl by lead pellets introduced to wetland habitats through the hunting of these birds. Waterfowl ingest the pellets, which are abraded in their gizzards and result in lead poisoning. This has long been a recognized problem in areas of concentrated hunting on the wintering grounds. The U.S.F.W.S. has set in motion a process of eliminating the use of lead shot for waterfowl hunting in the United States by 1991. Recently it has been recognized that ducks may pick up the few pellets that can give rise to lead poisoning, at any stage of their annual cycle. Ingestion of lead may occur in low-density hunting areas in Canada, with the symptoms not developing until weeks later when the birds are south of the border. The incidence of lead pellets in waterfowl gizzards, and of lead concentrations in the blood, will be investigated in both hunted and protected areas in Prince Edward Island as well as elsewhere in the Maritimes. Lead shot restrictions may be implemented in areas where concentrations of lead shot are believed to be damaging waterfowl populations or in other ways affecting environmental quality.

Serious outbreaks of contagious diseases, such as avian cholera and botulism, occur occasionally at staging areas where large numbers of migrating waterfowl concentrate. Avian botulism has recently caused serious mortality at Common Eider colonies in the Gulf of St. Lawrence. Although few instances of such epizootics have been recorded in Atlantic Canada, it is important to detect and respond to such outbreaks as soon as they happen, and to be aware of conditions which favour these diseases. Field staff of government wildlife agencies will be trained to detect

and report disease outbreaks, through agreements with the Atlantic Veterinary College in Charlottetown, P.E.I., and other veterinary colleges and agencies, which will co-ordinate the response to such incidents.

Conclusion

The Prince Edward Island Waterfowl Management Plan has been prepared in order to chart a course for waterfowl conservation efforts over the next 15 years. It attempts to address all issues of importance to waterfowl on the island. It proposes solutions and specific actions, some of which we know to be controversial. This document has been approved, and it will form the basis for planning annual activities by CWS-AR, P.E.I. Fish and Wildlife Branch, and co-operating non-government organizations.

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